This article describes the impact of virtual reality (VR) on medical education and why companies that create medical education materials must immediately become aware of this technology if they are not already.

VR is the computer-generated simulation of a 3-dimensional image or environment that can be interacted with in an immersive way with the use of a headset with a screen inside or gloves fitted with sensors. Closely related is augmented reality (AR), which is a live direct or indirect view of a physical, real-world environment whose elements are augmented (or supplemented) by computer-generated sensory input such as sound, video, or graphics.

**VR Entering into Mainstream**
VR and related technologies are positioned to enter into the mainstream consumer market in 2017 and beyond with an extremely high growth rate as they enter into various niche markets. The 2016 holiday season marked the first time that high-end VR headsets from Oculus, Sony, HTC and other major players were on store shelves. In 2016, VR equipment and hardware surpassed 1 billion in sales for the first time.¹

Before and during 2016, various industries have been experimenting with using VR.¹ For example:

- Architects are using VR to create interactive visualizations of construction projects in place of 3D models, or fly-through video. This approach can enable clients to make changes before work starts.
- Hotels and real estate agents are now providing VR guides to properties.
- Schoolchildren are being educated via virtual classrooms.
- Emergency response workers have used VR to practice how to respond to faults with nuclear reactors.
- It is now possible to receive trade training, such as heating and air, online in a virtual classroom.
Not to mention what’s happening in clinical practice and medical education...

VR in Healthcare
The global market for VR in healthcare alone is projected to reach $3.8 billion by 2020, driven by technology advancements in healthcare IT, expanding applications to diverse medical disciplines, and increasing demand for rehabilitation and simulation training.

Obviously, a high potential exists for the use of VR applications in healthcare, as the technology enables simulation, training, and modeling without the need for live human bodies or cadavers. Applications will be relevant to wide ranging medical specialties, including medical education (both clinician and patient), surgery, psychiatry, and rehabilitation.

VR in healthcare provides a revolutionary way to improve patients’ understanding of disease processes, educate them about the benefits of behavior modification, and strengthen medication compliance. VR technology is also playing a crucial role in medical education and professional skills training for minimally-invasive surgeries and operating room procedures.

The technology continues to gain increased demand as a diagnostic tool as well as in the treatment of phobias, autism, post-traumatic stress disorder, depression, anxiety, and severe pain in burn victims. Furthermore, the technology is effectively used in the treatment of pain by increasing cognitive activity which is known to inhibit the transmission of pain signals to the brain, thus reducing the need for painkillers and narcotics.

Other major factors driving adoption of virtual reality technology in the healthcare sector include increasing incidence of neurological disorders especially due to the aging population, growing disease awareness among patients, and rising demand for innovative diagnostic techniques.

Growing popularity of endoscopic surgical techniques, simulation training tools and computer assisted or robotic systems are proving to be extremely beneficial for the future growth of market. In addition, increased hospital spending on advanced medical devices and technologies, rapid evolution of graphics hardware, database gloves, computer aided design and miniaturization are other factors driving adoption of VR technology.

**How Medical Education Companies Will Need to Adjust**

Given the fact that clinicians are starting to use VR and AR routinely in clinical practice, driven in part by increasing patient demand, it will be important for agencies creating medical education materials to avoid reliance on simplistic PowerPoint presentations, manuscripts, and even online interactive modules as a form of medical education. Over the next few years, medical education companies and creative agencies will increasingly need to understand the VR space and how to implement projects that use this format.

It will also be important that medical writers know how to create scripts for VR content. In a conventional 2D script setting, it is enough to write out the wording for audio, creative directions, and a visual description. In 360 footage (used for VR), because the camera is at the center of the action, it’s necessary to describe what is taking place in all 4 quadrants (figure).

In contrast to standard video, there is no hidden area where the lights, and camera operators can be located. Lighting must be worked into the set itself so that it appears as part of the scenario. Likewise, the only place the camera cannot “see” is directly under the camera, so the camera operator or director must sit directly under the camera or must actually appear as part of the set (a little less cramped than perched in the camera rig).

In the case of a medical training video, the camera might be located on a surgeon or other healthcare professional. Ambisonic microphones that pick up sound in a 3D manner must also be used.

![Figure. The virtual reality/360 video set showing the four quadrants that must be described in scripts.](image-url)
One could expect a script would be written as follows, although there is as of yet no industry standard:

<table>
<thead>
<tr>
<th>Additional Direction</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-90°</td>
</tr>
<tr>
<td>90-180°</td>
</tr>
<tr>
<td>180-270°</td>
</tr>
<tr>
<td>270-360°</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Scene 1 1:00 minute</th>
<th>Scene 2 30 seconds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surgical nurse listening to surgeon</td>
<td>Surgical nurse watching incision</td>
</tr>
<tr>
<td>Patient on operating table</td>
<td>Patient on operating table</td>
</tr>
<tr>
<td>Surgeon describing procedure [insert wording here]</td>
<td>Surgeon makes incision and describes what he is doing [insert wording here]</td>
</tr>
<tr>
<td>Table with surgical instruments</td>
<td>Table with surgical instruments, nurse 2 handing instruments to surgeon</td>
</tr>
</tbody>
</table>

Fortunately, with the increasing use of VR and AR in many industries, several studios can specifically create this type of content. These production studios are adept in creating 360 content to be used in VR projects. However, the expertise of these studies is typically in video production, not medical science; therefore, it will be important to involve medical writers and clinicians to provide technical script writing and guidance on projects.

Some additional considerations are as follows:

- The use of 360 cameras and creation of VR dramatically increases the time projects take and consequently the pricing of projects. It is important to understand the technology, what is involved, and to be able to explain to clients why pricing is so much higher. Even a 10-minute video requires “stitching” together of 360 film components and may take weeks rather than hours to produce.
- Know that the medium is still really new, which opens the opportunity for creativity, opportunity, and added value to clients.
- Larger companies, including CNN, Turner Network, the NY Times, as well as large medical communications agencies now have “heads of VR” as a dedicated position on staff. For small-to-medium medical education companies, it makes sense to appoint a person who familiarizes themselves with this medium and is able to develop strategy for introducing this medium in to the company as an offering to clients. The VRARA (the VR/AR association) is a useful organization located nationwide and has a Digital Health Committee to which this author belongs.
- Medical writers working as freelancers and at medical communications companies should also familiarize themselves with writing content for VR productions as well as understand the uses of VR/AR in medicine and medical education.
I hope that you are familiar with the VR format and have it covered, but if Nascent Medical can assist with any medical writing projects including those for the 360 video/VR format, please email us.

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About Nascent Medical, LLC
Nascent Medical, LLC, serves the continuing medical education and medical content publishing industries. We have over 100 MD-/PhD-level writers on hand. We are available to write about any topic, any time.

Valued current clients include Elsevier's PracticeUpdate, Medscape, Dana Farber Cancer Institute, Imedex, Intellisphere, Axis Medical Education, Axess, Apothecom, American Urological Association, and many others.

As a member of VRARA (The Virtual Reality/Augmented Reality Association), Dr. Nichols is also familiar with virtual reality and is intrigued with the implications of this technology in medical education.

Her book on freelance medical writing available at
http://www.amazon.com/gp/aw/d/B00T6XF9YO

Check out the Medical Writers Speak podcast at

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i Deloitte. Virtual reality (VR): a billion dollar niche